REMARKS

Reconsideration and allowance of the present application are respectfully requested. Claims 1-9 remain pending in the application. By the foregoing amendment, claim 5 is amended.

Applicants note with appreciation the Examiner's indication in the Office Action that claims 5-7 contain allowable subject matter. In response, claim 5 is amended to incorporate the base claim and the intervening claims.

In numbered paragraph 3, page 2 of the Office Action, independent claim 1, along with various dependent claims, is rejected as being unpatentable over U.S. Patent 4,196,442 (Kuniya et al.) over U.S. Patent 4,482,912 (Chiba et al.). This rejection is respectfully traversed.

Applicants have disclosed a high-power press pack semiconductor module (1). Included with the high-power press pack semiconductor module (1) are an electrically conducting base plate (4); at least one electrically conducting top plate (3); at least one semiconductor chip (2) including semiconductor material, a first main electrode that makes contact with the base plate forming a plane interface and a second main electrode that makes contact with the top plate, a housing (11, 12, 13) containing the base plate, top plate and semiconductor chip. A material is provided adjacent at least one of the first or second main electrodes that, together with the semiconductor material forms an eutectic alloy or an alloy whose melting point is below that of the semiconductor material. At least one of the base plate (4) or top plate (3) is made of metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that

of the semiconductor material. The metal matrix composite material contains alloy-forming material.

The foregoing features are broadly encompassed by claim 1 which recites a high-power press pack semiconductor module (1), including, among other features, an electrically conducting base plate (4); at least one electrically conducting top plate (3); at least one semiconductor chip (2) including semiconductor material, a first main electrode that makes contact with the base plate forming a plane interface and a second main electrode that makes contact with the top plate, a housing (11, 12, 13) containing the base plate, top plate and semiconductor chip, wherein a material is provided adjacent at least one of said first or second main electrodes that, together with the semiconductor material forms an eutectic alloy or an alloy whose melting point is below that of the semiconductor material, characterized in, that at least one of said base plate (4) or top plate (3) is made of metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that of the semiconductor material, said metal matrix composite material containing said alloy-forming material. Claim 5 incorporates the recited features of claim 1.

The Kuniya et al. patent does not teach or suggest a high-power press pack semiconductor module wherein at least one of base plate (4) or top plate (3) is made of metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that of the semiconductor material, said metal matrix composite material containing said alloy-forming material, as

recited in claim 1. The Kuniya et al. patent discloses that it is desirable that the surface portion of the electrode which is bonded or contacted to the semiconductor substrate has isotropy as far as possible (e.g., col. 4, lines 14-16 and 53-58 and fig. 1). The Kuniya et al. patent discloses that a random distribution leads to bulging or swelling of the composition (col. 4, line 31-39, col. 10, line 10-19), rendering a random distribution disadvantageous. Accordingly, the Kuniya et al. patent appears to teach away from a plate (4) being made of a metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix.

The Chiba et al. patent does not cure the deficiencies of the Kuniya et al. patent. The Chiba et al. patent, which cites the Kuniya et al. patent (col.1, line 25 and col. 7, line 6), discloses first and second matrix-fibered composites (e.g., 100) constructed of a copper matrix 110 and bundles of carbon fibers 130 which are embedded in the copper matrix 110 (col. 3, line 11-18 and col. 6, line 59- col. 7, line 3). Between these two layers a metal layer is arranged (col. 2, line 66-col. 3, line 3). The Chiba et al. patent discloses that a stacked or laminated structure is rigidly integrated by sandwiching a metal layer between the first and second matrix-fiber composites (col. 2, line 4-7, vol. 7, line 22-23). Accordingly, the Chiba et al. patent teaches such a combination of these three layers, as exemplified in Fig. 2. As taught by the Chiba et a. patent, only such a combination can serve to integrate into a semiconductor device, the usage of one of these layers, leaving out the metal layer or the second matrix-fiber composites, is neither disclosed nor suggested. The Chiba et al. patent would not have taught or suggested a high-power press pack semiconductor module wherein at least one of base plate (4) or top plate (3) is made

of metal matrix composite material comprising of two-dimensional randomly distributed short cut graphite fibers in the plane of the interface in an Al or Ag matrix, whose coefficient of thermal expansion is close to that of the semiconductor material, said metal matrix composite material containing said alloy-forming material, as recited in claim 1.

The Kuniya et al. patent would not have taught or suggested the use of a metal matrix material with randomly distributed short cut graphite fibers, and the Chiba et al. patent would not have taught or suggested the use of one layer with a matrix composite material which has a thermal extension coefficient close to that of the semiconductor material. Accordingly, one of ordinary skill in the art would not have been motivated to combine these references.

Applicants have discovered certain advantages in using randomly distributed graphic fibers. For example, the content of graphite fiber can be easily changed, whereas when using a knitted cloth there are only very limited possibilities to change the content. Furthermore, by using a knitted cloth the thermal extension coefficient is influenced only in lateral direction, whereas with randomly distributed fibers the coefficient can also be adapted in a direction perpendicular to the surface of the chip. As the semiconductor module is a press-pack module, no bow from manufacturing or processing condition arises (see page 5 of the description, last sentence of par. 2). The applied references, even if considered in combination as suggested by the Examiner, would not render the recited claim features encompassing these advantages.

For the foregoing reasons, Applicants' claims 1 and 5 are allowable. The remaining rejected claims depend from the respective independent claims and recite

additional advantageous features which further distinguish over the documents relied upon by the Examiner. As such, the present application is in condition for allowance.

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the application is in condition for allowance and a Notice of Allowance is respectfully solicited.

Respectfully submitted,

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